### Frequency
Every 2 years

### Remarque
Every 2 years. Postponed to next spring 2020.

### Summary
This course discusses advanced methods extensively used for the processing, prediction, and classification of temporal (multi-dimensional and multi-channel) sequences. In this context, it also describes key links between signal processing, linear algebra, statistics and artificial neural networks.

### Content
- **Introduction**: statistical (static and dynamic) pattern recognition, temporal pattern recognition problems
- **Basic tools in temporal pattern modeling**: Correlation, autocorrelation, linear/nonlinear AR, ARMA and ARCH modeling
- **Statistical pattern recognition**: Bayes classifiers, artificial neural networks (ANNs), discriminant functions, Expectation-Maximization algorithm, dynamic programming
- **Sequence processing**: discrete Markov models, hidden Markov models (HMM), autoregressive (AR)-HMM, hybrid HMM/ANN systems, parameter estimation (EM and forward-backward algorithms applied to these models)
- **Laboratory exercises**: in statistical pattern recognition, autoregressive modeling, Markov models and hidden Markov models

### Note
Course notes (and relevant book chapters) available.

### Keywords
Statistical modeling, Markov models, hidden Markov models, artificial neural networks for sequence processing.

### Learning Prerequisites

#### Recommended courses
Undergraduate level statistics, linear algebra (matric computations, up to PCA) and minimum knowledge/interest in signal processing and machine learning. Programming in Matlab or similar.

Assessment methods
Multiple.

Resources
Websites
- http://wwwidiap.ch/resource/lectures/statistical-sequence-processing